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(54) Abstract Title
A combined dust cap and position indicating device, particularly for vehicle wheel nuts

(57) For indicating relative rotational displacement between a first member, such as a stud (20) on a wheel hub, and a second member, such as a wheel nut (22), which is rotatably engaged with the first member, a safety device (24) comprises a body (26) having a bore formed with equispaced grooves enabling the device to be releasably secured to the second member (22) in one position of a plurality of positions and having indicating means, such as a pointer (28), to indicate the position of the device (24) relative to a reference, such as a mark (32) on the rim (16) covering the wheel hub (14). The bore within the body (26) is closed at one end by an integral top wall (36) so that the body additionally serves as a dust cap for the conjoined first and second members (20, 22).

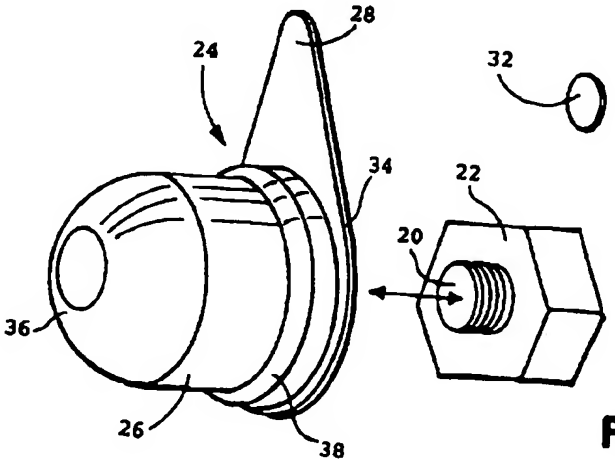

FIG. 3

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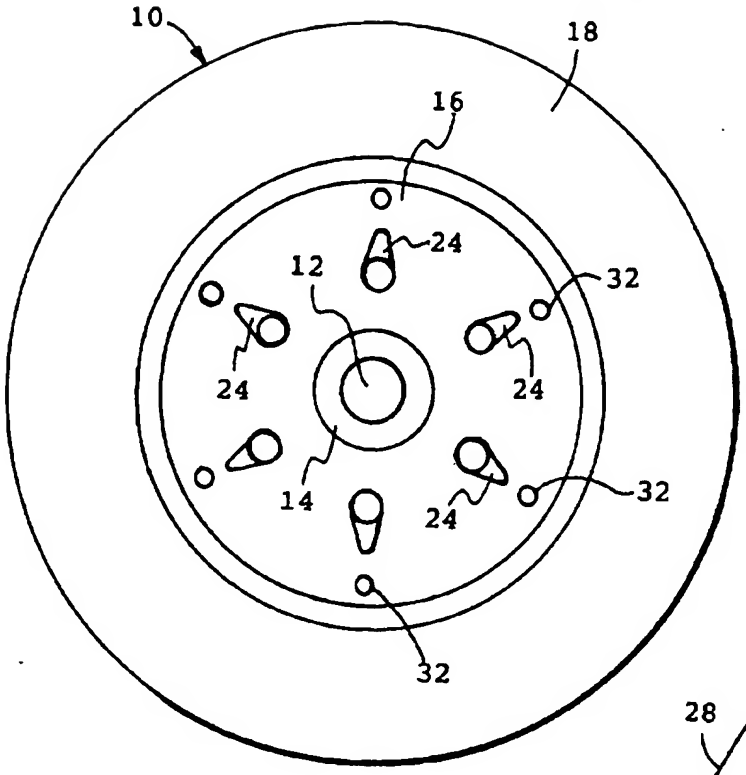

FIG. 1

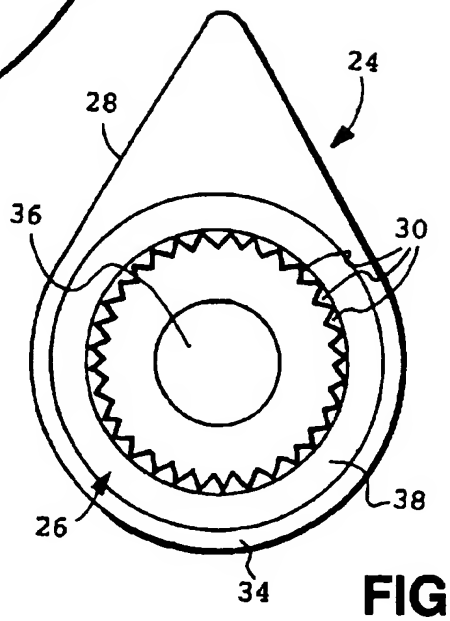

FIG. 2

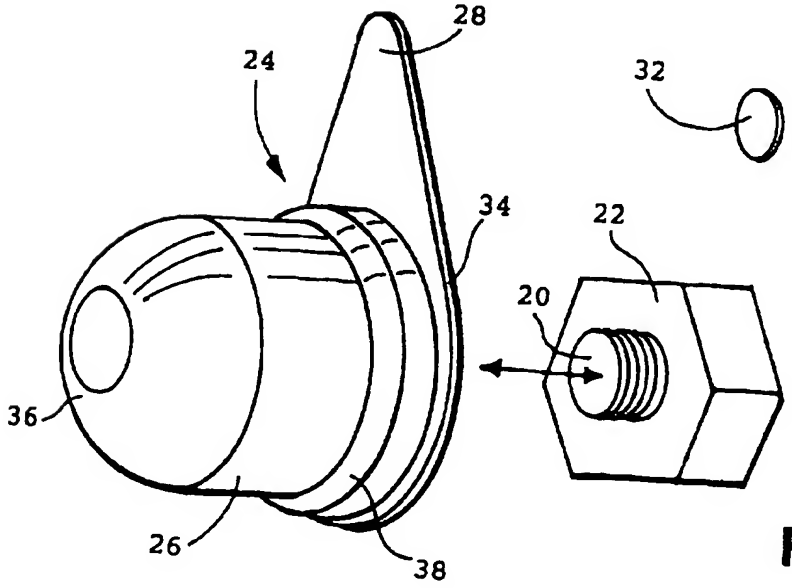

FIG. 3

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A Combined Dust Cap and Position Indicating Device, Particularly for Vehicle Wheel Nuts.

This invention concerns a combined dust cap and position indicating device, particularly but not exclusively for use upon vehicle wheel nuts.

According to the present invention a safety device for indicating relative rotational displacement between a first member and a second member which are relatively rotatably engaged with each other comprises a body having a bore formed with equispaced grooves enabling the device to be releasably secured to the second member in one position of a plurality of positions, having indicating means to indicate the position of the device relative to a reference, and having an integral closure to the bore at one end so that the body additionally serves as a dust cap for conjoined first and second members.

Such a device is particularly useful for indicating whether or not a wheel nut has become loose, in which respect the first member comprises a threaded stud on an axle hub, the second member comprises a wheel nut, and the reference comprises a mark on a wheel rim adjacent a respective stud hole.

The indicating means can comprise a pointer and the body and the

pointer can be formed either integrally or as separate components.

The present invention further comprises a vehicle wheel and hub assembly comprising studs on the hub and associated nuts securing the vehicle wheel to the hub, a safety device as defined in the preceding paragraphs being arranged on each nut, once tightened, with each device pointing to a reference.

The present invention will now be more particularly described with reference to the accompanying drawing in which:

Figure 1 is a side elevation of a vehicle wheel which has been fitted with a number of safety devices according to the present invention;

Figure 2 is a underside plan view of a preferred practical embodiment of a safety device of the present invention; and

Figure 3 is a perspective view , to a slightly reduced scale, showing the device illustrated in Fig. 2 being fitted over a wheel nut.

Referring to Figure 1 there is shown a vehicle wheel assembly (10) comprising an axle (12), a hub (14), and a rim (16) on which a tyre (18) is mounted. The hub (14) has six threaded studs (20) which pass through openings in the rim (16), and the rim (16) is secured to the hub (14) by nuts (22). A safety indicating device

(24) is attached to each nut (22). In this respect, each safety device (24) fits over and completely covers its respective nut (22) and the end of the stud (20) on which it is threadably engaged, so the latter are not visible in Figure 1, but can be seen in detail in Figure 3.

As shown in more detail in Figures 2 and 3, the device (24) comprises a circular body (26), though it can be hexagonal in section, having a pointer (28). The body (26) has a central bore which is provided with a number of equispaced grooves or splines (30) enabling the device (24) to be secured to the nut (22) by engagement between the corners of the nut and respective ones of the grooves or splines (30).

The bore of the body (26) is closed at one end by a rounded or bevelled top wall (36) so that the body as a whole serves as a dust cap for the threaded connection between the wheel nut (22) and the stud (20). The body (26) also has a flared region (38) adjacent the open end of the bore. The splines (30) do not extend to this flared region. Taken together, the provision of the top wall (36) and the flared region (38) substantially prevent dust and dirt clogging the connection between the wheel nut (22) and the stud (20) which is covered by the body (26). This means the connection between the nut (22) and the stud (20) is less prone to jamming or corrosion than a similar connection which is not provided with a dust cap.

The body (26) also has an outwardly raised rim (34) at the open

end of the bore and the pointer (28) is formed as an extension of this rim (34).

The body (26) is suitably produced from plastics, in one piece, by moulding. In this respect, the flared region (38) will assist release of the body from the mould.

The body may advantageously be produced from fluorescent plastics material, or the material of the body (26) (or at least the pointer (28)) may have a fluorescent coating applied to enhance its ready visibility.

Corresponding to each device (24), a reference in the form of a mark (32) is provided on the rim (16). The mark (32) can be painted onto the rim or stuck to the rim, and the mark can be fluorescent.

The bore in the body (26) and the splines (30) are sized so that the device (24) is a force fit on each nut (22) so that the device (24) will not become loose during use but can be released from the nut when necessary.

In order to use the device as illustrated in Figure 1, the rim (16) and therefore the tyre (18) is attached to the hub (14) in the usual way and all of the nuts (22) are tightened to the necessary degree of tightness. A device (24) is then attached to each wheel nut (22) so that each pointer (28) points to its respective reference mark (32).

It will be appreciated that if there is any relative movement between any one of the nuts (22) and its stud (20) the pointer (28) will not be pointing towards its reference mark (32). Therefore each device according to the present invention provide a visual indication if the nut to which it is attached has become loose without the need to jack the vehicle wheel and to test each nut for tightness by hand or by using a tool.

Whilst in the illustrated embodiment of the invention all of the pointers are directed radially outwardly, they can be directed in any direction which may be appropriate. For example, all of the pointers can point in a number of random directions provided that when each device is attached to a tightened nut its pointer will be directed towards a reference mark so that displacement between the pointer and the reference mark can be visually noted.

Further, the pointers on adjacent nuts can point towards each other, so that the adjacent pointer becomes a reference mark. In such an arrangement, if both nuts loosen, they diverge from the reference mark (the opposite pointer) at a greater rate.

The mark (32) can be omitted, and the pointers can be directed in a common direction, e.g. all parallel to one another, or all radially outwardly or inwardly, so that if one or more of the wheel nuts became loose, the displacement of the safety devices is readily noted by the eye.

If it is required to tighten a wheel nut the device (24) can be removed from the nut by applying leverage between the device and the wheel rim or applying a pulling load to the device (24) to remove the device from the nut. After tightening has taken place the device is replaced so that the indicator (28) is pointing towards the reference mark (32). If it is not possible when replacing the device for the pointer (28) to point directly to the reference point (32) the reference mark can be removed from its existing position and relocated so that the pointer (28) is directed towards it.

Claims

1. A safety device for indicating relative rotational displacement between a first member and a second member which are relatively rotatably engaged with each other, the device comprising a body having a bore formed with equispaced grooves enabling the device to be releasably secured to the second member in one position of a plurality of positions, having indicating means to indicate the position of the device relative to a reference, and having an integral closure to the bore at one end so that the body additionally serves as a dust cap for conjoined first and second members.

2. A device as claimed in claim 1 in which the indicating means comprises a pointer.

3. A device as claimed in claim 2 in which the body and the pointer are formed integrally.

4. A device as claimed in claim 2 in which the body and the pointer are formed separately.

5. A device as claimed in claim 3 in which the body is formed with an outwardly raised rim at the open end of the bore and the pointer is formed as an extension of the rim.

6. A device as claimed in any preceding claim in which the body has a flared region at or adjacent to the open end of the bore.

7. A device as claimed in any preceding claim in which the first member comprises a threaded stud and the second member comprises a nut.

8. A device as claimed in any preceding claim in which the reference comprises a mark on a structure to be secured between the first and second members.

9. A device as claimed in any preceding claim which is fluorescent.

10. A safety indicating device constructed and arranged for use and operation substantially as herein described.

11. A vehicle wheel and hub assembly, the wheel being secured to the hub by means of fixed threaded studs on the hub extending through holes in the wheel and nuts on the studs clamping the wheel to the hub, a safety indicating device as claimed in any one of the preceding claims arranged on each nut, once tightened, with each device pointing to a reference.

12. A vehicle wheel and hub assembly constructed and arranged for use and operation substantially as herein described.

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INVESTOR IN PEOPLE

Application No: GB 9912702.9 **Examiner:** Tom Sutherland
Claims searched: 1 - 12 **Date of search:** 21 July 1999

Patents Act 1977
Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.Q): F2H (HTE, HQE, HQF, HQY)

Int Cl (Ed.6): F16B 31/02, 31/04, 37/14

Other: Online: EPODOC, WPI, JAPIO

Documents considered to be relevant:

Category	Identity of document and relevant passage		Relevant to claims
Y	GB 2242720 A	(BUSINESS LINES)	1, 2, 4, 8 and 11
Y	US 5120174	(WHEEL MASTERS) See he Figs.	1, 2, 4, 8 and 11

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
&	Member of the same patent family	E	Patent document published on or after, but with priority date earlier than, the filing date of this application.